

# **CHP: Good Today – Better Tomorrow!**

**While Hospitals can benefit from CHP systems available today, CHP is destined to become even better tomorrow.**

**Manufacturers and the Department of Energy are working together to design new standardized packaged systems that have lower costs per unit capacity and are easier to install and maintain.**

**Next 17 slides address the following questions about future developments in CHP.**

- **What is a Packaged CHP System?**
- **What are the Additional Benefits of a Packaged CHP System?**
- **Why will Packaged Systems be Lower in Cost?**
- **Who is Developing Packaged Systems?**
- **What Type of New Packaged Units are Suitable for Hospitals?**
- **How Can I Find Packaged Systems?**
- **Where Can I Get Free Preliminary Evaluation?**



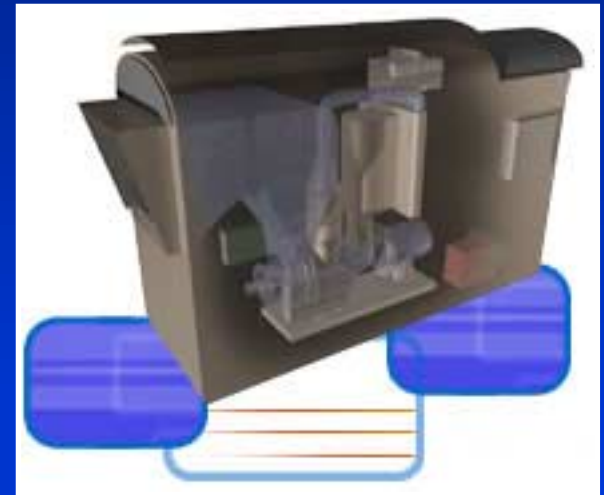
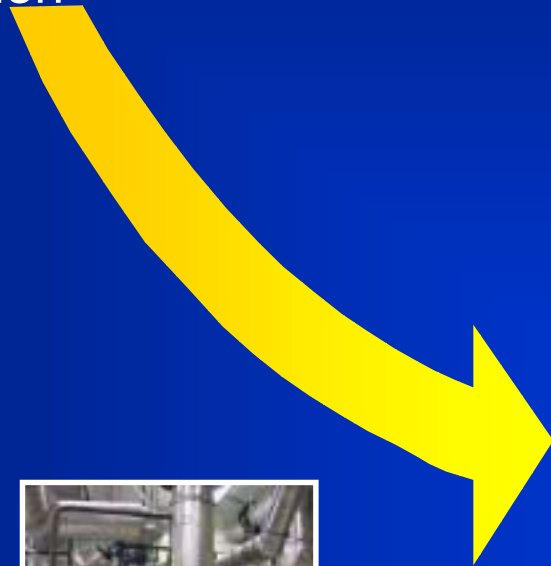
# What is a Packaged CHP System?

- **Conventional CHP systems are designed, delivered and installed component by component on a case-by-case (custom) basis**
- **Packaged CHP systems feature pre-connected, pre-engineered components that are designed, delivered and installed as a single unit.**



# What is a Packaged CHP System? (continued)

**Conventional Custom-Engineered:** Turbines, Reciprocating Engines, Absorption Chillers, Desiccants, Refrigeration



**PACKAGED:** Integrated Energy System - Optimized Package for Hospitals

# What Are the Benefits of a Packaged CHP System?

- Reduced equipment cost
- Lower installation cost
- Shorter installation time
- Optimized system energy and emissions performance



# **Why Will Packaged Systems be Lower in Cost?**

**US DOE is Partnering with CHP Component Manufacturers to Develop Packaged CHP Systems with Lower Up-Front Engineering and Installation Costs.**

## **These Modular Units Will:**

- Feature “Plug-and-Play” Design: Standard Connections and Pre-Connected Components Render Systems More Appliance-Like**
- Be Easy to Install in Multiples to Provide Additional Increments of Power, Heat, Cooling**



# Who is Developing CHP Packaged Systems ?

## NiSource Team

Using programmable controls and other technologies, the NiSource system provides benefits customized to each individual facility.

**NiSource**

## Burns & McDonnell Team

The Burns & McDonnell system can be built up in modular increments matched to your facility needs and can be easily expanded as the need arises.



**Solar Turbines**  
A Caterpillar Company



## Gas Technology Institute Team

This easily adaptable system is already optimized for a variety of customer facilities.

**gti**



## Honeywell Team

This system features supervisory controls that optimize facility supply- and demand-side energy options.

**Honeywell**

KNOWLEDGE | INNOVATION | RESULTS | 24x7 SERVICE



## United Technologies Team

The small size of this system is specially well suited for retrofit applications and can augment existing systems.



# What Type of New Packaged Units are Suitable for Hospitals?

**The Packaged Systems Under Development Cover a Range of Sizes that can Supply the Needs of our variety of Facilities:**

- **Microturbine and engine-based systems**
  - » **Modular units supplied in increments of less than 1,000 kW — as small as 60 kW**
- **Gas turbine-based systems**
  - » **For larger facilities or more than one facility, with unit sizes of over 1,000 kW up to about 5,000 kW**



# How Can I Find Packaged Systems?

- Project teams are installing test systems in demonstration sites
- Vendors are prepared to speak with customers
- Commercial production and distribution of CHP Systems available
- Dept. of Energy is seeking additional hospital interest in CHP! Contact Jan Berry at Oak Ridge National Laboratory: *berryjb@ornl.gov*
- For current status and contacts check [www.eere.energy.gov/de/technologies/euid\\_bchp\\_packgd.shtml](http://www.eere.energy.gov/de/technologies/euid_bchp_packgd.shtml)





# Packaged CHP Modules of < 1000 kW

## Development Teams

1. United Technologies/Capstone
2. NiSource
3. Gas Technology Institute

## Design

- Microturbine (Team #s 1 & 2) or Reciprocating Engine (Team #3) Generates Electricity
- Absorption Chillers Use the Heat in the Exhaust to Produce Space Cooling and Heating

## Applications

- These smaller systems are especially helpful in retrofit and facility expansion situations
- Augment existing equipment

## Benefits

- Displace/Augment Electric Chillers
- Replace Less Efficient / Higher Emission Boiler Systems
- Reduce Peak Demand and Electricity Use Charges
- Smaller modules allow closer matching of system output with facility loads
- Comprehensively pre-engineered and tested to maximize “plug-n-play” advantage



# Packaged CHP Modules of 1,000 kW to 5,000 kW

## Development Teams

- Burns & McDonnell
- Honeywell

## Design

- Turbine Generators Provide Electricity
- Absorption Chillers Use Exhaust Heat to Produce Space Cooling, Heating
- Microgrid Functionality Option

## Applications

- Facilities in clustered or campus-type arrangements, such as hospitals, universities, airports

## Benefits

- Displace/Augment Electric Chillers
- Replace Less Efficient / Higher Emission Boiler Systems
- Reduce Peak Demand and Electricity Use Charges
- Microgrid Configuration Ensures Supply to Critical Loads
- Integration at Enterprise Level Helps Optimize Energy Supply and Demand Choices



# CHP Packaged Systems < 1,000 kW

## United Technologies and Capstone Microturbine

**Prototype:** Electricity from microturbine with hot water recovery and cooling  
Four 60-kW microturbines with 118-RT absorption chiller

### Unique features

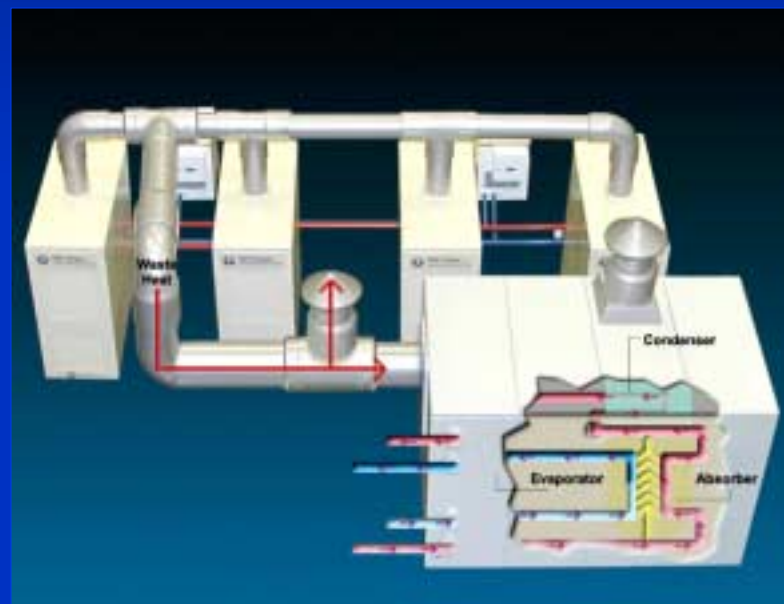
- Extremely efficient solution
- Carrier Corp. to perform marketing, sales and maintenance functions

### Initial Demonstration Site

- Commercial setting at United Technologies facility

### Schedule

- Demo unit installed and providing data



# CHP Packaged Systems < 1,000 kW NiSource Team

**Prototype:** Two 30 kW Microturbines  
with heat recovery unit and 10 RT absorption chiller

## Unique features

- Computer-based intelligent control systems shifts heat dynamically throughout building

## Initial Demonstration Site

- New construction, 100 room hotel

## Schedule

- System already installed
- Desiccant unit, solar cells to be added



# CHP Packaged Systems < 1,000 kW

## Gas Technology Institute Team

**Prototypes:** Phase I: 590 kW engine paired with 90 RT absorption chiller  
Phase II: 250 kW engine paired with 40 RT absorption chiller

### Unique features

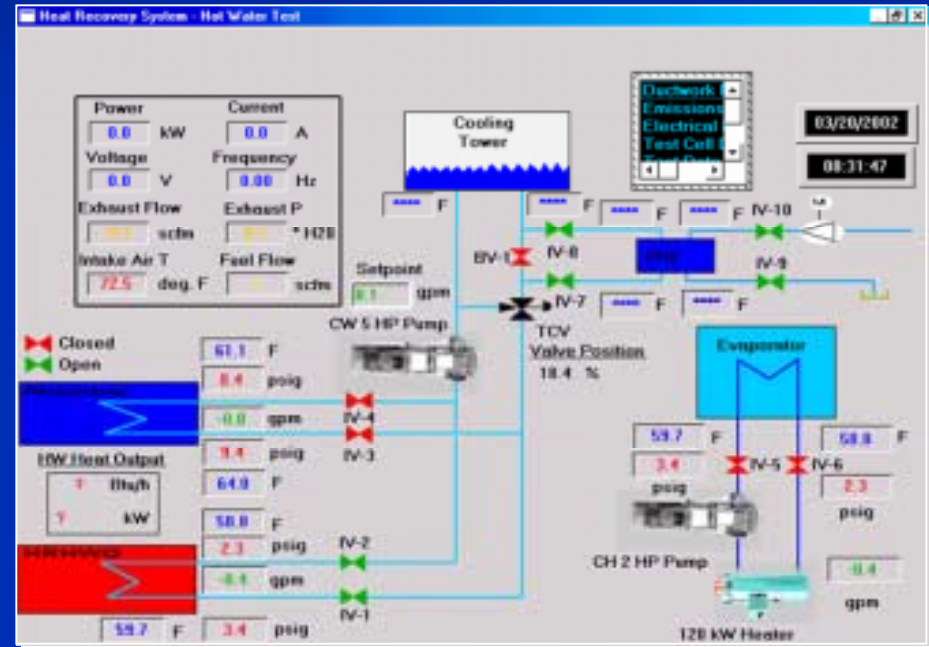
- Absorption chiller on one skid, engine and heat recovery unit on another provides maximum component and sizing flexibility
- Waukesha to serve as distributor

### Initial Demonstration Site

- Educational Facility Retrofit -- TBD

### Schedule

- Expert Panel for Final Design Just Completed
- Site to be Selected by Fall 2003
- Field Demonstration with Data Acquisition





# CHP Packaged Systems Over 1,000 kW to 5,000 kW

## Honeywell Team

**Prototype:** 5 MW turbine, 1,000 RT absorption chilling

### Unique features

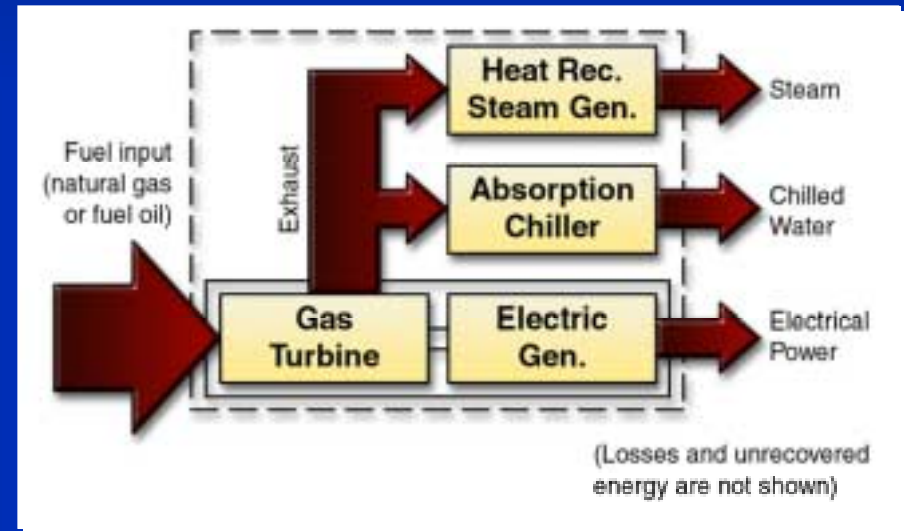
- Turbine Exhaust Used to Produce Both Steam and Chilled Water
- Microgrid Provides Power for 33% of Critical Electric Load

### Initial Demonstration Site

- Ft. Bragg Army Base (N. Carolina)  
-- retrofit

### Schedule

- Installation to be Completed in 2004
- Field Demonstration with Data Acquisition



# CHP Packaged Systems Over 1,000 kW to 5,000 kW

## Burns and McDonnell Team

**Prototype:** 5 MW turbine, 2,500 RT of absorption cooling

### Unique features

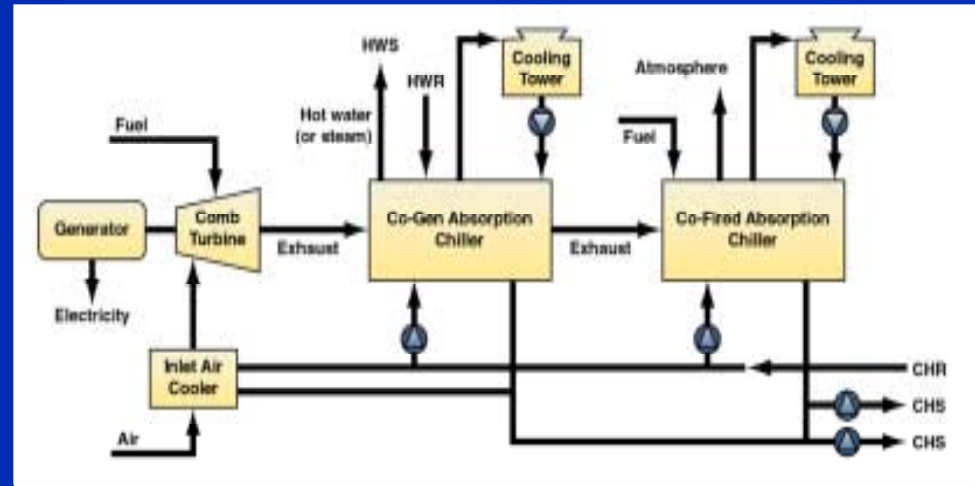
- Turbine Exhaust Used to Produce Chilled Water
- Microgrid Functionality

### Initial Demonstration Site

- Austin Energy  
(Municipal Utility)  
to Own and Operate
- Energy Supplied to New  
High-Tech Industrial Park

### Schedule

- Installation to be Completed in 2004
- Field Demonstration and Data Acquisition in 2004



# Where Can I Get Free Preliminary Evaluation of CHP Application in My Hospital?

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- The U.S. DOE supports a program to perform the first-level screening analysis for CHP applications in hospitals at no cost to you
- Send your hospital information in a form that you can download at <http://www.bchp.org/prof-assessment.html#form> or Contact Jan Berry at Oak Ridge National Laboratory:  
[berryjb@ornl.gov](mailto:berryjb@ornl.gov)

